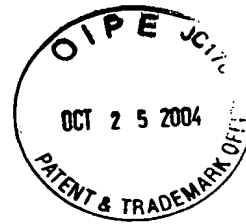


SEQUENCE LISTING



<110> JESTIN, JEAN-LUC
VICHIER-GUERRE, SOPHIE

<120> METHODS FOR OBTAINING THERMOSTABLE ENZYMES, DNA POLYMERASE I
VARIANTS FROM THERMUS AQUATICUS HAVING NEW CATALYTIC ACTIVITIES,
METHODS FOR OBTAINING THE SAME, AND APPLICATIONS OF THE SAME

<130> 248628USOX

<140> 10/787,219

<141> 2004-02-27

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<170> PatentIn version 3.3

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Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
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 <213> *Thermus aquaticus*

<400> 22

Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly Ser Pro Lys Ala
 1 5 10 15

Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe
 20 25 30

Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala
 35 40 45

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala
 50 55 60

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser
 65 70 75 80

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro
 85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
 100 105 110

Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg
 115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu
 130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu
 145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val
 165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
 180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn
 195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala
 225 230 235 240

Val Leu Gly Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
 245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
 275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu
 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala
 305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Thr Leu Asp Tyr Ser Gln
 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile
 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp
 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala
 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg
 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile
 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys
 420 425 430

Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly
 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg
 450 455 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala
 465 470 475 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu
485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu
500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu
515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val
530 535 540

Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala Ala Ala Leu Val
545 550 555 560

Pro Arg

<210> 23
<211> 1688
<212> DNA
<213> Thermus aquaticus

<400> 23
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ccccctggcc ccgcccggaa ggggccttcg tgggctttgt gctttccgc aaggagccca 120
tgtggggccga tcttctggcc ctggccgccc ccaggggggg ccgggtccac cgggcccccg 180
agccttataa agccctcagg gacctgaagg aggcgcgggg gcttctcgcc aaagacctga 240
gcgttctggc cctgagggaa ggccttggcc tccgcccgg cgacgacccc atgctcctcg 300
cctacctcct ggacccttcc aacaccaccc ccgagggggg ggcccggcgc tacggcgggg 360
agtggacgga ggaggcgggg gagcggggccg ccctttccga gaggtcttc gccaacctgt 420
gggggagggt tgaggggggag gagaggctcc tttggcttta ccgggagggt gagaggcccc 480
tttccgctgt cctggcccac atggaggcca cgggggtgcg cctggacgtg gcctatctca 540
gggccttgtc cctggagggt gccgaggaga tcgccgcct cgaggccgag gtcttccgcc 600

| | | | | | | |
|------------|------------|------------|------------|------------|------------|------|
| tgcccgcca | ccccttccaa | ctcaaccaac | gggaccagct | ggaaagggtc | ctctttgacg | 660 |
| agctagggct | tcccgccatc | ggcaagacgg | agaagaccgg | caagcgctcc | accagcgccg | 720 |
| ccgtcctgga | ggccctccgc | gaggcccacc | ccatcgtgga | gaagatcctg | cagtaccggg | 780 |
| agctcaacaa | gctgaagagc | acccaaatta | ctcagttgcc | ggacctcatc | caccccagga | 840 |
| cgggcccgtt | ccacaccgcg | ttcaaccaga | cggccacgca | aacgggcagg | ctaagtagct | 900 |
| cccagcccaa | cctccagaac | atccccgtcc | gcaccccgct | tgggcagagg | atccgcccga | 960 |
| ccttcatcgc | cgaggagggg | aggctattgg | tggccctgga | ctataaccag | atagagctca | 1020 |
| gggtgctggc | ccacctctcc | ggcgacgaga | acctgatccg | ggtcttccag | gaggggcccg | 1080 |
| acatccacac | ggagaccgcc | agctggatgt | tggcgctccc | ccgggaggcc | gtggaccccc | 1140 |
| tgatgcgccg | ggcggccaag | accatcaact | tgggggtcct | ctacggcatg | tggccccacc | 1200 |
| gcctctccca | ggagctagcc | atcccttacg | aggaggccca | ggccttcatt | gagcgctact | 1260 |
| ttcagagctt | ccccagggtg | cgggcctgga | ttgagaagac | cctggaggag | ggcaggaggc | 1320 |
| gggggtacgt | ggagaccctc | ttcggccgcc | gccgctacct | gccagaccta | gaggcccagg | 1380 |
| tgaagaatgt | gcgggaggcg | gccgagcgca | gggccttcaa | catgcccgtc | cagggcaccg | 1440 |
| ccgccgacct | catgaagctg | gctatggtga | agctcttccc | caggctggag | gaaatggggg | 1500 |
| ccaggatgct | ccttcaggtc | cacgacgagc | tggtcctcga | ggccccaaaa | gagggggcgg | 1560 |
| aggccgtggc | ccggctggcc | aaggaggtca | tggagggggg | gtatcccctg | gccgtgcctc | 1620 |
| tggaggtgga | ggtggggata | ggggaggact | ggctctccgc | caaggaggcg | gccgcactgg | 1680 |
| tgccgcgc | | | | | | 1688 |

<210> 24

<211> 562

<212> PRT

<213> *Thermus aquaticus*

<400> 24

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Ser | Gly | Gly | Gly | Gly | Cys | Gly | Gly | Gly | Gly | Ser | Pro | Lys | Ala |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe
 20 25 30

Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala
 35 40 45

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala
 50 55 60

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser
 65 70 75 80

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro
 85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
 100 105 110

Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg
 115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu
 130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu
 145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val
 165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
 180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Gln Leu Asn
 195 200 205

Gln Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala
 225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
 245 250 255

Gln Tyr Arg Glu Leu Asn Lys Leu Lys Ser Thr Gln Ile Thr Gln Leu
 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
 275 280 285

Gln Thr Ala Thr Gln Thr Gly Arg Leu Ser Ser Ser Gln Pro Asn Leu
 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Thr
 305 310 315 320

Phe Ile Ala Glu Glu Gly Arg Leu Leu Val Ala Leu Asp Tyr Asn Gln
 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile
 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp
 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala
 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg
 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile
 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys
 420 425 430

Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly
 435 440 445

Arg Arg Arg Tyr Leu Pro Asp Leu Glu Ala Gln Val Lys Asn Val Arg
 450 455 460

Glu Ala Ala Glu Arg Arg Ala Phe Asn Met Pro Val Gln Gly Thr Ala
 465 470 475 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu
 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu
 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu
 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val
 530 535 540

Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val
 545 550 555 560

Pro Arg

<210> 25
 <211> 1688
 <212> DNA
 <213> Thermus aquaticus

<400> 25
 ccatggcctc tgggtggcgggt ggctgtggtg gcggtggcag cccaaggcc ctggaggagg 60
 ccccttgcc cccgccgaa ggggccttcg tgggctttgt gctttccgc aaggagccca 120
 tgtgggccga tcttctggcc ctggccgccg ccaggggggg ccgggtccac cgggcccccg 180
 agccttataa agccctcagg gacctgaagg aggcgcgggg gcttctcgcc aaagacctga 240

| | |
|--|------|
| gcgttctggc cctgagggaa ggccttggcc tcccgcccg cgacgacccc atgctcctcg | 300 |
| cctacctcct ggacccttcc aacaccaccc ccgaggggggt ggcccggcgc tacggcgggg | 360 |
| agtggacgga ggaggcgggg gagcggggccg ccctttccga gaggtcttcc gccaacctgt | 420 |
| gggggaggct tgagggggag gagaggctcc tttggcttta ccgggaggtg gagaggcccc | 480 |
| tttccgctgt cctggcccac atggaggcca cgggggtgcg cctggacgtg gcctatctca | 540 |
| gggccttgtc cctggaggtg gccgaggaga tcgcccgcct cgaggccgag gtcttccgcc | 600 |
| tggccggcca ccccttcaac ctcaactccc gggaccagct ggaaagggtc ctctttgacg | 660 |
| agctagggct tcccgccatc ggcaagacgg agaagaccgg caagcgctcc accagcgccg | 720 |
| ccgtcctgga ggccctcgc gagggcccacc ccatcgtgga gaagatcctg cagtaccggg | 780 |
| agctcaccaa gctgaagagc acctacattg accccttgcc ggacctcatc caccacagga | 840 |
| cgggccgcct ccacaccgc ttcaaccaga cggccacggc cacgggcagg ctaagtagct | 900 |
| ccgatcccaa cctccagaac atccccgtcc gcaccccgtc tgggcagagg atccgcccgg | 960 |
| ccttcacgc cgaggagggg tggctattgg tggccctgga ctatagccag atagagctca | 1020 |
| gggtgctggc ccacctctcc ggcgacgaga acctgatccg ggtcttccag gaggggcggg | 1080 |
| acatccacac ggagaccgcc agctggatgt tcggcgctcc ccgggaggcc gtggaccccc | 1140 |
| tgatgcgccg ggcggccaag accatcaact tcggggctct ctacggcatg tcggcccacc | 1200 |
| gcctctccca ggagctagcc atcccttacg aggaggccca ggccttcatt gagcgctact | 1260 |
| ttcagagctt cccaagggtg cgggcctgga ttgagaagac cctggaggag ggcaggaggc | 1320 |
| gggggtacgt ggagaccctc ttcggccgcc gccgctacgt gccagaccta gagggccggg | 1380 |
| tgaagagcgt gcgggaggcg gccgagcgca tggccttcaa catgcccgctc cagggcaccg | 1440 |
| ccgccgacct catgaagctg gctatggtga agctcttccc caggctggag gaaatggggg | 1500 |
| ccaggatgct ccttcaggtc cacgacgagc tggctctcga ggccccaaaa gagagggcgg | 1560 |
| aggccgtggc ccggctggcc aaggaggtca tggaggggggt gtatcccctg gccgtgcccc | 1620 |
| tggaggtgga ggtggggata ggggaggact ggctctccgc caaggaggcg gccgcactgg | 1680 |
| tgccgcgc | 1688 |

<210> 26
 <211> 562
 <212> PRT
 <213> *Thermus aquaticus*

<400> 26

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Ser | Gly | Gly | Gly | Gly | Cys | Gly | Gly | Gly | Gly | Ser | Pro | Lys | Ala |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Glu | Glu | Ala | Pro | Trp | Pro | Pro | Pro | Glu | Gly | Ala | Phe | Val | Gly | Phe |
| | | | 20 | | | | | 25 | | | | | 30 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Leu | Ser | Arg | Lys | Glu | Pro | Met | Trp | Ala | Asp | Leu | Leu | Ala | Leu | Ala |
| | | 35 | | | | | 40 | | | | | 45 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Ala | Arg | Gly | Gly | Arg | Val | His | Arg | Ala | Pro | Glu | Pro | Tyr | Lys | Ala |
| | 50 | | | | | 55 | | | | | 60 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Arg | Asp | Leu | Lys | Glu | Ala | Arg | Gly | Leu | Leu | Ala | Lys | Asp | Leu | Ser |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Leu | Ala | Leu | Arg | Glu | Gly | Leu | Gly | Leu | Pro | Pro | Gly | Asp | Asp | Pro |
| | | | | 85 | | | | | 90 | | | | | 95 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Leu | Leu | Ala | Tyr | Leu | Leu | Asp | Pro | Ser | Asn | Thr | Thr | Pro | Glu | Gly |
| | | | 100 | | | | | 105 | | | | | 110 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Ala | Arg | Arg | Tyr | Gly | Gly | Glu | Trp | Thr | Glu | Glu | Ala | Gly | Glu | Arg |
| | | 115 | | | | | 120 | | | | | 125 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Ala | Leu | Ser | Glu | Arg | Leu | Phe | Ala | Asn | Leu | Trp | Gly | Arg | Leu | Glu |
| | 130 | | | | | 135 | | | | | 140 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Glu | Glu | Arg | Leu | Leu | Trp | Leu | Tyr | Arg | Glu | Val | Glu | Arg | Pro | Leu |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Ala | Val | Leu | Ala | His | Met | Glu | Ala | Thr | Gly | Val | Arg | Leu | Asp | Val |
| | | | | 165 | | | | | 170 | | | | | 175 | |

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
 180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn
 195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala
 225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
 245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
 275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu
 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala
 305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln
 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile
 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp
 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala
 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg
 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile
 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys
 420 425 430

Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly
 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg
 450 455 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala
 465 470 475 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu
 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu
 500 505 510

Glu Ala Pro Lys Glu Arg Ala Glu Ala Val Ala Arg Leu Ala Lys Glu
 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val
 530 535 540

Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val
 545 550 555 560

Pro Arg

<210> 27

<211> 1688
 <212> DNA
 <213> *Thermus aquaticus*

<400> 27
 ccatggcctc tgggtggcgggt ggctgtggtg gcggtggcag ccccaaggcc ctggaggagg 60
 ccccttgccc cccgccggaa ggggccttcg tgggctttgt gctttcccgc aaggagccca 120
 tgtggggccga tcttctggcc ctggccgccg ccaggggggg ccgggtccac cgggcccccg 180
 agccttataa agccctcagg gacctgaagg aggcgcgggg gcttctcgcc aaagacctga 240
 gcgttctggc cctgaggga ggccttgccc tcccgcccgg cgacgacccc atgctcctcg 300
 cctacctcct ggacccttcc aacaccaccc ccgagggggg gggccggcgc tacggcgggg 360
 agtggacgga ggaggcgggg gagcggggccg ccctttccga gaggtcttc gccaacctgt 420
 gggggaggct tgaggggggag gagaggctcc tttggcttta ccgggagggtg gagaggcccc 480
 tttccgctgt cctggcccac atggaggcca cgggggtgcg cctggacgtg gcctatctca 540
 gggccttgtc cctggagggtg gccgaggaga tcgcccgcct cgaggccgag gtcttccgcc 600
 tggccggcca ccccttcaac ctcaactccc gggaccagct ggaaagggtc ctctttgacg 660
 agctagggtc tcccgccatc ggcaagacgg agaagaccgg caagcgctcc accagcgccg 720
 tcgtcctgga ggccctccgc gagggcccacc ccatcgtgga gaagatcctg cagtaccggg 780
 agctcaccaa gctgaagagc acctacattg accccttgcc ggacctcatc caccacagga 840
 cgggcccgcct ccacaccgc ttcaaccaga cggccacggc cacgggcagg ctaagtagct 900
 ccgatcccaa cctccagaac atccccgtcc gcaccccgct tgggcagagg atccgccggg 960
 ccttcatcgc cgaggagggg tggctattgg tggccctgga ctatagccag atagagctca 1020
 ggggtgctggc ccacctctcc ggcgacgaga acctgatccg ggtcttccag gaggggcggg 1080
 acatccacac ggagaccgcc agctggatgt tcggcgctcc cggggaggcc gtggaccccc 1140
 tgatgcgccg ggcggccaag agcatcaact tcggggtcct ctacggcatg tcggcccacc 1200
 gcctctccca ggagctagcc atcccttacg aggaggccca ggccttcatt gagcgctact 1260
 ttcagagctt cccaaggtg cgggcctgga ttgagaagac cctggaggag ggcaggaggc 1320
 gggggtacgt ggagaccctc ttcggccgcc gccgctacgt gccagaccta gagggccggg 1380

tgaagagcgt gcgggaggcg gccgagcgca tggccttcaa catgcccgtc cagggcaccg 1440
 ccgccgacct catgaagctg gctatgggtga agctctcccc caggctggag gaaatggggg 1500
 ccaggatgct ccttcaggtc cacgacgagc tggtcctcga ggccccaaaa gagggggcg 1560
 aggccgtggc ccggctggcc aaggaggtca tggaggggggt gtatcccctg gccgtgcccc 1620
 tggaggtgga ggtgggggata ggggaggacc ggctctccgc caaggaggcg gccgcactgg 1680
 tgccgcgc 1688

<210> 28
 <211> 562
 <212> PRT
 <213> Thermus aquaticus

<400> 28

Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly Ser Pro Lys Ala
 1 5 10 15

Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe
 20 25 30

Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala
 35 40 45

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala
 50 55 60

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser
 65 70 75 80

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro
 85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
 100 105 110

Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg
 115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu
 130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu
 145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val
 165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
 180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn
 195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Val
 225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
 245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
 275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu
 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala
 305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln
 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile
 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp
 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala
 370 375 380

Ala Lys Ser Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg
 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile
 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys
 420 425 430

Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly
 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg
 450 455 460

Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala
 465 470 475 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Ser Pro Arg Leu Glu
 485 490 495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu
 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu
 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val

530

535

540

Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala Ala Ala Leu Val
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Pro Arg

<210> 29

<211> 1688

<212> DNA

<213> *Thermus aquaticus*

<400> 29

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tgtgggccga tcttctggcc ctggccgccc ccaggggggg cgggtccac cgggcccccg      180
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gcgttctggc cctgaggga ggccttggcc tcccgcccgg cgacgacccc atgctcctcg      300
cctacctcct ggacccttcc aacaccaccc ccgagggggg ggcccggcgc tacggcgggg      360
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tttccgctgt cctggccccc atggaggcca cgggggtgcg cctggacgtg gcctatctca      540
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tggccggcca ccccttcaac ctcaactccc gggaccagct ggaaagggtc ctctttgacg      660
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cgggcccgcct ccacaccgc ttcaaccaga cggtcacggc cacgggcagg ctaagtagct      900
ccgatcccaa cctccagaac atccccgtcc gcaccccgct tgggcagagg atccgcccgg      960
ccttcacgcg cgaggagggg tggctattgg tggccctgga ctatagccag atagagctca     1020

```

```

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tgatgcgccg ggcgggccaag accatcaact tcggggctcct ctacggcatg tcggcccacc 1200
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tgccgcgc 1688

```

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<210> 30
<211> 562
<212> PRT
<213> Thermus aquaticus

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<400> 30

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Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly Ser Pro Lys Ala
1           5           10          15

```

```

Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe
          20           25           30

```

```

Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala
          35           40           45

```

```

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala
          50           55           60

```

```

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser
65           70           75           80

```

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro
 85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
 100 105 110

Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg
 115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu
 130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu
 145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val
 165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
 180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn
 195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala
 225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
 245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
 275 280 285

Gln Thr Val Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu
 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala
 305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln
 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile
 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp
 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala
 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg
 385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile
 405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys
 420 425 430

Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly
 435 440 445

Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg
 450 455 460

Glu Ala Ala Glu Arg Met Ala Tyr Asn Met Pro Val Gln Gly Thr Ala
 465 470 475 480

Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu

485

490

495

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu
 500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu
 515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val
 530 535 540

Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val
 545 550 555 560

Pro Arg

<210> 31
 <211> 1688
 <212> DNA
 <213> Thermus aquaticus

<400> 31
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 tgtgggccga tcttctggcc ctggccgccc ccaggggggg ccgggtccac cgggcccccg 180
 agccttataa agccctcagg gacctgaagg aggcgcgggg gcttctcgcc aaagacctga 240
 gcgttctggc cctgagggaa ggccttgcc tcccgcccg cgacgacccc atgctcctcg 300
 cctacctcct ggacccttcc aacaccaccc ccgagggggg ggcccggcgc tacggcgggg 360
 agtggacgga ggaggcggg gagcgggccc ccctttccga gaggtcttc gccaacctgt 420
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| | |
|---|------|
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| ccgtcctgga ggccctccgc gagggcccacc ccatcggtga gaagatcctg cagtaccggg | 780 |
| agctcaccaa gctgaagagc acctacattg accccttgcc ggacctcatc caccgccagga | 840 |
| cgggcccgcct ccacacccgc ttcaaccaga cggccacggc cacggggcagg ctaagtagct | 900 |
| ccgatcccaa cctccagaac atccccgtcc gcaccccgtc tgggcagagg atccgccggg | 960 |
| ccttcacgcg cgaggagggg tggctattgg tggccctgga ctatagccag atagagctca | 1020 |
| gggtgctggc ccacctctcc ggcgacgaga acctgatccg ggtcttcag gaggggagg | 1080 |
| acatccacac ggagaccgcc agctggatgt tcggcgctcc ccgggaggcc gtggaccccc | 1140 |
| tgatgcgccg ggcgccaag accatcaact tcggggctct ctacggcatg tcggcccacc | 1200 |
| gcctctccca ggagctagcc atcccttacg aggaggccca ggccttcatt gagcgctact | 1260 |
| ttcagagctt cccaagggtg cgggcctgga ttgagaagac cctggaggag ggcaggaggc | 1320 |
| gggggtacgt ggagaccctc ttcggccgcc gccgctacgt gccagaccta gagggccggg | 1380 |
| tgaagagcgt gcgggaggcg gccgagcgca tggccttcaa catgcccgtc cagggcaccg | 1440 |
| ccgccgacct catgaagctg gctatggtga agctcttccc caggctggag gaaatggggg | 1500 |
| ccaggatgct ccttcaggtc cacgacgagc tggctctcga ggccccaaaa gagggggcgg | 1560 |
| aggccgtggc ccggctggcc aaggaggtea tggagggggg gtatcccctg gccgtgcccc | 1620 |
| tggaggtgga ggtggggata ggggaggacc ggctctccgc caaggaggcg gccgcactgg | 1680 |
| tgccgcgc | 1688 |

<210> 32
 <211> 562
 <212> PRT
 <213> *Thermus aquaticus*

<400> 32

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Ser | Gly | Gly | Gly | Gly | Cys | Gly | Gly | Gly | Gly | Ser | Pro | Lys | Ala |
| 1 | | | 5 | | | | | 10 | | | | | 15 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Glu | Glu | Ala | Pro | Trp | Pro | Pro | Pro | Glu | Gly | Ala | Phe | Val | Gly | Phe |
| | | | 20 | | | | | 25 | | | | | 30 | | |

| | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Leu | Ser | Arg | Lys | Glu | Pro | Met | Trp | Ala | Asp | Leu | Leu | Ala | Leu | Ala | 35 | 40 | 45 |
| Ala | Ala | Arg | Gly | Gly | Arg | Val | His | Arg | Ala | Pro | Glu | Pro | Tyr | Lys | Ala | 50 | 55 | 60 |
| Leu | Arg | Asp | Leu | Lys | Glu | Ala | Arg | Gly | Leu | Leu | Ala | Lys | Asp | Leu | Ser | 65 | 70 | 75 |
| Val | Leu | Ala | Leu | Arg | Glu | Gly | Leu | Gly | Leu | Pro | Pro | Gly | Asp | Asp | Pro | 85 | 90 | 95 |
| Met | Leu | Leu | Ala | Tyr | Leu | Leu | Asp | Pro | Ser | Asn | Thr | Thr | Pro | Glu | Gly | 100 | 105 | 110 |
| Val | Ala | Arg | Arg | Tyr | Gly | Gly | Glu | Trp | Thr | Glu | Glu | Ala | Gly | Glu | Arg | 115 | 120 | 125 |
| Ala | Ala | Leu | Ser | Glu | Arg | Leu | Phe | Ala | Asn | Leu | Trp | Gly | Arg | Leu | Glu | 130 | 135 | 140 |
| Gly | Glu | Glu | Arg | Leu | Leu | Trp | Leu | Tyr | Arg | Glu | Val | Glu | Arg | Pro | Leu | 145 | 150 | 155 |
| Ser | Ala | Val | Leu | Ala | His | Met | Glu | Ala | Thr | Gly | Val | Arg | Leu | Asp | Val | 165 | 170 | 175 |
| Ala | Tyr | Leu | Arg | Ala | Leu | Ser | Leu | Glu | Val | Ala | Glu | Glu | Ile | Ala | Arg | 180 | 185 | 190 |
| Leu | Glu | Ala | Glu | Val | Phe | Arg | Leu | Ala | Gly | His | Pro | Phe | Asn | Leu | Asn | 195 | 200 | 205 |
| Ser | Arg | Asp | Gln | Leu | Glu | Arg | Val | Leu | Phe | Asp | Glu | Leu | Gly | Leu | Pro | 210 | 215 | 220 |
| Ala | Ile | Gly | Lys | Thr | Glu | Lys | Thr | Gly | Lys | Arg | Ser | Thr | Ser | Ala | Ala | 225 | 230 | 235 |
| | | | | | | | | | | | | | | | | 240 | | |

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu
290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala
305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln
325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile
340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp
355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala
370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg
385 390 395 400

Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile
405 410 415

Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys
420 425 430

Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly

| | | | | |
|---|-----|-----|-----|-----|
| 435 | | 440 | | 445 |
| Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg | | | | |
| 450 | | 455 | | 460 |
| Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala | | | | |
| 465 | | 470 | | 480 |
| Ala Asp Leu Met Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu | | | | |
| | 485 | | 490 | 495 |
| Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu | | | | |
| | 500 | | 505 | 510 |
| Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu | | | | |
| | 515 | | 520 | 525 |
| Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val | | | | |
| | 530 | | 535 | 540 |
| Gly Ile Gly Glu Asp Arg Leu Ser Ala Lys Glu Ala Ala Ala Leu Val | | | | |
| 545 | | 550 | | 560 |

Pro Arg

<210> 33
 <211> 1688
 <212> DNA
 <213> Thermus aquaticus

| | |
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| ccccctggcc cccgccggaa ggggccttcg tgggctttgt gctttcccgc aaggagccca | 120 |
| tgtggggccga tcttctggcc ctggccgccg ccaggggggg ccgggtccac cgggcccccg | 180 |
| agccttataa agccctcagg gacctgaagg aggcgcgggg gcttctcgcc aaagacctga | 240 |
| gcgttctggc cctgagggaa ggccttggcc tcccgcccgg cgacgacccc atgctcctcg | 300 |

| | | | | | | |
|------------|------------|-------------|------------|------------|------------|------|
| cctacctcct | ggacccttcc | aacaccaccc | ccgagggggt | ggcccggcgc | tacggcgggg | 360 |
| agtggacgga | ggaggcgggg | gagcggggccg | ccctttccga | gaggctcttc | gccaacctgt | 420 |
| gggggaggct | tgagggggag | gagaggctcc | tttggcttta | ccgggaggtg | gagaggcccc | 480 |
| tttccgctgt | cctggcccac | atggaggcca | cgggggtgcg | cctggacgtg | gcctatctca | 540 |
| gggccttgtc | cctggaggtg | gccgaggaga | tcgcccgcct | cgaggccgag | gtcttccgcc | 600 |
| tggccggcca | ccccttcaac | ctcaactccc | gggaccagct | ggaaagggtc | ctctttgacg | 660 |
| agctagggct | tcccgccatc | ggcaagacgg | agaagaccgg | caagcgctcc | accagcgccg | 720 |
| ccgtcctgga | ggccctccgc | gaggcccacc | ccatcgtgga | gaagatcctg | cagtaccggg | 780 |
| agctcaccaa | gctgaagagc | acctacattg | acccttgcc | ggacctcatc | caccccagga | 840 |
| cgggccgcct | ccacacccgc | ttcaaccaga | cggccacggc | cacgggcagg | ctaagtagct | 900 |
| ccgatcccaa | cctccagaac | atccccgtcc | gcaccccgtc | tgggcagagg | atccgccggg | 960 |
| ccttcatcgc | cgaggagggg | tggctattgg | tggccctgga | ctatagccag | atagagctca | 1020 |
| gggtgctggc | ccacctctcc | ggcgacgaga | acctgatccg | ggtcttccag | gaggggcggg | 1080 |
| acatccacac | ggagaccgcc | agctggatgt | tcggcgtccc | ccgggaggcc | gtggaccccc | 1140 |
| tgatgcgccg | ggcggccaag | accatcaact | tcggggtcct | ctacggcatg | tcggcccacc | 1200 |
| gcctctccca | ggagctagcc | atcccttacg | aggaggccca | ggccttcatt | gagcgctact | 1260 |
| ttctgagctt | ccccaaagtg | cgggcctgga | ttgagaagac | cctggaggag | ggcaggaggc | 1320 |
| gggggtacgt | ggagaccctc | ttcggccgcc | gccgctacgt | gccagaccta | gaggcccggg | 1380 |
| tgaagagcgt | gcgggaggcg | gccgagcgca | aggccttcaa | catgcccgtc | cagggcaccg | 1440 |
| ccgccgacct | catgaagctg | gctatgggtga | agctcttccc | caggctggag | gaaatggggg | 1500 |
| ccaggatgct | ccttcaggtc | cacgacgagc | tggtcctcga | ggccccaaaa | gagggggcgg | 1560 |
| aggccgtggc | ccggctggcc | aaggagggtca | tggagggggg | gtatcccctg | gccgtgctcc | 1620 |
| tggaggtgga | ggtggggata | ggggaggact | ggctctccgc | caaggaggcg | gccgcactgg | 1680 |
| tgccgcgc | | | | | | 1688 |

<210> 34
<211> 562

<212> PRT
<213> Thermus aquaticus

<400> 34

Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly Ser Pro Lys Ala
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Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe
20 25 30

Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala
35 40 45

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala
50 55 60

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser
65 70 75 80

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro
85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
100 105 110

Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg
115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu
130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu
145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val
165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn
 195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
 210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala
 225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
 245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
 260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
 275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu
 290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala
 305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln
 325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile
 340 345 350

Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp
 355 360 365

Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala
 370 375 380

Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg

<400> 35

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| ccccctggcc | cccgccggaa | ggggccttcg | tgggctttgt | gctttcccgc | aaggagccca | 120 |
| tgtggggccga | tcttctggcc | ctggccgccc | ccaggggggg | ccgggtccac | cgggcccccg | 180 |
| agccttataa | agccctcagg | gacctgaagg | aggcgcgggg | gcttctcgcc | aaagacctga | 240 |
| gcgttctggc | cctgagggaa | ggccttggcc | tcccgcccg | cgacgacccc | atgctcctcg | 300 |
| cctacctcct | ggacccttcc | aacaccaccc | ccgagggggg | ggcccggcgc | tacggcgggg | 360 |
| agtggacgga | ggaggcgggg | gagcgggccg | ccctttccga | gaggctcttc | gccaacctgt | 420 |
| gggggaggct | tgagggggag | gagaggctcc | tttggttta | ccgggagggtg | gagaggcccc | 480 |
| tttccgctgt | cctggcccac | atggaggcca | cgggggtg | cctggacgtg | gcctatctca | 540 |
| gggccttgtc | cctggagggtg | gccgaggaga | tcgcccgcct | cgaggccgag | gtcttccgcc | 600 |
| tggccggcca | ccccttcaac | ctcaactccc | gggaccagct | ggaaagggtc | ctctttgacg | 660 |
| agctagggct | tcccgccatc | ggcaagacgg | agaagaccgg | caagcgctcc | accagcgccg | 720 |
| ccgtcctgga | ggccctccgc | gaggcccacc | ccatcgtgga | gaagatcctg | cagtaccggg | 780 |
| agctcaccaa | gctgaagagc | acctacattg | acccttgca | ggacctcatc | caccccagta | 840 |
| cgggcccgcct | ccacaccgc | ttcaaccaga | cggccacggc | cacgggcagg | ctaagtagct | 900 |
| ccgatcccaa | cctccagaac | atccccgtcc | gcaccccgt | tgggcagagg | atccgcccgg | 960 |
| ccttcatcgc | cgaggagggg | tggctattgg | tggccctgga | ctatagccag | atagagctca | 1020 |
| gggtgctggc | ccacctctcc | ggcgacgaga | acctgatccg | ggtcttccag | gaggggcggg | 1080 |
| acatccacac | ggagaccgcc | agctggatgt | tcggcgctcc | ccgggaggcc | gtggaccccc | 1140 |
| tgatgcgccg | ggcggccaag | accatcaact | tcggggctct | ctacggcatg | tcggcccacc | 1200 |
| gcctctccca | ggagctagcc | atcccttacg | aggaggccca | ggccttcatt | gagcgctact | 1260 |
| ttcagagctt | ccccaagggtg | cgggcctgga | ttgagaagac | cctagaggag | ggcaggaggc | 1320 |
| gggggtacgt | ggagaccctc | ttcggccgcc | gccgctacgt | gccagaccta | gaggccccgg | 1380 |
| tgaagagcga | gcgggaggcg | gccgagcgca | tggcctacaa | catgcccgtc | cagggcaccg | 1440 |
| ccgccgacct | catgaagctg | gctatggtga | agctcttccc | caggctggag | gaaatggggg | 1500 |

cccggatgct ccttcaggtc cacgacgagc tggtcctcga ggccccaaaa gagggggcgg 1560
 aggccgtggc ccggctggcc aaggaggtca tggaggggggt gtatcccctg gccgtgcccc 1620
 tggaggcgga ggtggggata ggggaggatt ggctctccgc caaggaggcg gccgcactgg 1680
 tgccgcgc 1688

<210> 36
 <211> 562
 <212> PRT
 <213> *Thermus aquaticus*

<400> 36

Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly Ser Pro Lys Ala
 1 5 10 15

Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe
 20 25 30

Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala
 35 40 45

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala
 50 55 60

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser
 65 70 75 80

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro
 85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
 100 105 110

Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg
 115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu
 130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu
145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val
165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn
195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala
225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
260 265 270

Gln Asp Leu Ile His Pro Ser Thr Gly Arg Leu His Thr Arg Phe Asn
275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu
290 295 300

Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala
305 310 315 320

Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln
325 330 335

Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile

| 340 | | | | | 345 | | | | | 350 | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Val | Phe | Gln | Glu | Gly | Arg | Asp | Ile | His | Thr | Glu | Thr | Ala | Ser | Trp |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Met | Phe | Gly | Val | Pro | Arg | Glu | Ala | Val | Asp | Pro | Leu | Met | Arg | Arg | Ala |
| | 370 | | | | | 375 | | | | | 380 | | | | |
| Ala | Lys | Thr | Ile | Asn | Phe | Gly | Val | Leu | Tyr | Gly | Met | Ser | Ala | His | Arg |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| Leu | Ser | Gln | Glu | Leu | Ala | Ile | Pro | Tyr | Glu | Glu | Ala | Gln | Ala | Phe | Ile |
| | | | | 405 | | | | | 410 | | | | | 415 | |
| Glu | Arg | Tyr | Phe | Gln | Ser | Phe | Pro | Lys | Val | Arg | Ala | Trp | Ile | Glu | Lys |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| Thr | Leu | Glu | Glu | Gly | Arg | Arg | Arg | Gly | Tyr | Val | Glu | Thr | Leu | Phe | Gly |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| Arg | Arg | Arg | Tyr | Val | Pro | Asp | Leu | Glu | Ala | Arg | Val | Lys | Ser | Glu | Arg |
| | 450 | | | | | 455 | | | | | 460 | | | | |
| Glu | Ala | Ala | Glu | Arg | Met | Ala | Tyr | Asn | Met | Pro | Val | Gln | Gly | Thr | Ala |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 |
| Ala | Asp | Leu | Met | Lys | Leu | Ala | Met | Val | Lys | Leu | Phe | Pro | Arg | Leu | Glu |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| Glu | Met | Gly | Ala | Arg | Met | Leu | Leu | Gln | Val | His | Asp | Glu | Leu | Val | Leu |
| | | | 500 | | | | | 505 | | | | | 510 | | |
| Glu | Ala | Pro | Lys | Glu | Gly | Ala | Glu | Ala | Val | Ala | Arg | Leu | Ala | Lys | Glu |
| | | 515 | | | | | 520 | | | | | 525 | | | |
| Val | Met | Glu | Gly | Val | Tyr | Pro | Leu | Ala | Val | Pro | Leu | Glu | Ala | Glu | Val |
| | 530 | | | | | 535 | | | | | 540 | | | | |

Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val
 545 550 555 560

Pro Arg

<210> 37
 <211> 1688
 <212> DNA
 <213> *Thermus aquaticus*

<400> 37
 ccatggcctc tgggtggcggg ggctgtggtg gcggtggcag cccaaggcc ctggaggagg 60
 ccccttgcc cccgccgga ggggccttcg tgggctttgt gctttccgc aaggagccca 120
 tgtgggccga tcttctggcc ctggccgccg ccaggggggg ccgggtccac cgggcccccg 180
 agccttataa agccctcagg gacctgaagg aggcgcgggg gcttctcgcc aaagacctga 240
 gcgttctggc cctgaggga ggccttgcc tccgcgccg cgacgacccc atgctcctcg 300
 cctacctcct ggacccttcc aacaccaccc ccgagggggg ggcccggcgc tacggcgggg 360
 agtggacgga ggaggcggg gagcgggccg ccttttccga gaggtcttc gccaacctgt 420
 gggggagggt tgagggggag gagaggctcc tttggcttta ccgggagggt gagaggcccc 480
 tttccgctgt cctggcccac atggaggcca cgggggtgcg cctggacgtg gcctatctca 540
 gggccttgtc cctggagggt gccgaggaga tcgcccgcct cgaggccgag gtcttccgcc 600
 tggccggcca ccccttcaac ctcaactccc gggaccagct ggaaagggtc ctctttgacg 660
 agctaggggt tcccgccatc ggcaagacgg agaagaccgg caagcgctcc accagcgccg 720
 ccgtcctgga ggccctccgc gaggcccacc ccatcggtga gaagatcctg cagtaccggg 780
 agctcaccaa gctgaagagc acctacattg accccttgcc ggacctcatc caccagga 840
 cgggccgcct ccacaccgc ttcaaccaga cggccacggc cacgggcagg ctaagtagct 900
 ccgatcccaa cctccagaac atccccgtcc gcaccccgct tgggcagagg atccgccggg 960
 ccttcacgc cgaggagggg tggctattgg tggccctgga ctatagccag atagagctca 1020
 gggtgctggc ccacctctcc ggcgacgaga acctgatccg ggtcttcag gagggcggg 1080
 acatccacac ggagaccgcc agctggatgt tcggcgctcc ccgggaggcc gtggaccccc 1140

tgatgcgccg ggcggccaag accatcaact tcgggggtcct ctacggcatg tcggcccacc 1200
 gcctctccca ggagctagcc atcccttacg aggaggccca ggccttcatt gagcgctact 1260
 ttcagagctt cccaaggtg cgggcctgga ttgagaagac cctggaggag ggcaggaggc 1320
 ggggggtacgt ggagaccctc ttcggccgcc gccgctacgt gccagaccta gaggcccggg 1380
 tgaagagcgt gcgggaggcg gccgagcgca tggccttcaa catgcccgtc cagggcaccg 1440
 ccgccgacct cgtgaagctg gctatggtga agctcttccc caggctggag gaaatggggg 1500
 ccaggatgct ccttcaggtc cacgacgagc tggtcctcga ggccccaaaa gaggggggcg 1560
 aggccgtggc ccggctggcc aaggaggtca tggagggggg gtatcccctg gccgtgcccc 1620
 tggaggtgga ggtggggata ggggaggact ggctctccgc caaggaggcg gccgcactgg 1680
 tgccgcgc 1688

<210> 38
 <211> 562
 <212> PRT
 <213> *Thermus aquaticus*

<400> 38

Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly Ser Pro Lys Ala
 1 5 10 15

Leu Glu Glu Ala Pro Trp Pro Pro Pro Glu Gly Ala Phe Val Gly Phe
 20 25 30

Val Leu Ser Arg Lys Glu Pro Met Trp Ala Asp Leu Leu Ala Leu Ala
 35 40 45

Ala Ala Arg Gly Gly Arg Val His Arg Ala Pro Glu Pro Tyr Lys Ala
 50 55 60

Leu Arg Asp Leu Lys Glu Ala Arg Gly Leu Leu Ala Lys Asp Leu Ser
 65 70 75 80

Val Leu Ala Leu Arg Glu Gly Leu Gly Leu Pro Pro Gly Asp Asp Pro
 85 90 95

Met Leu Leu Ala Tyr Leu Leu Asp Pro Ser Asn Thr Thr Pro Glu Gly
100 105 110

Val Ala Arg Arg Tyr Gly Gly Glu Trp Thr Glu Glu Ala Gly Glu Arg
115 120 125

Ala Ala Leu Ser Glu Arg Leu Phe Ala Asn Leu Trp Gly Arg Leu Glu
130 135 140

Gly Glu Glu Arg Leu Leu Trp Leu Tyr Arg Glu Val Glu Arg Pro Leu
145 150 155 160

Ser Ala Val Leu Ala His Met Glu Ala Thr Gly Val Arg Leu Asp Val
165 170 175

Ala Tyr Leu Arg Ala Leu Ser Leu Glu Val Ala Glu Glu Ile Ala Arg
180 185 190

Leu Glu Ala Glu Val Phe Arg Leu Ala Gly His Pro Phe Asn Leu Asn
195 200 205

Ser Arg Asp Gln Leu Glu Arg Val Leu Phe Asp Glu Leu Gly Leu Pro
210 215 220

Ala Ile Gly Lys Thr Glu Lys Thr Gly Lys Arg Ser Thr Ser Ala Ala
225 230 235 240

Val Leu Glu Ala Leu Arg Glu Ala His Pro Ile Val Glu Lys Ile Leu
245 250 255

Gln Tyr Arg Glu Leu Thr Lys Leu Lys Ser Thr Tyr Ile Asp Pro Leu
260 265 270

Pro Asp Leu Ile His Pro Arg Thr Gly Arg Leu His Thr Arg Phe Asn
275 280 285

Gln Thr Ala Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn Leu

| 290 | 295 | 300 |
|--|-----|-----|
| Gln Asn Ile Pro Val Arg Thr Pro Leu Gly Gln Arg Ile Arg Arg Ala 305 310 315 320 | | |
| Phe Ile Ala Glu Glu Gly Trp Leu Leu Val Ala Leu Asp Tyr Ser Gln 325 330 335 | | |
| Ile Glu Leu Arg Val Leu Ala His Leu Ser Gly Asp Glu Asn Leu Ile 340 345 350 | | |
| Arg Val Phe Gln Glu Gly Arg Asp Ile His Thr Glu Thr Ala Ser Trp 355 360 365 | | |
| Met Phe Gly Val Pro Arg Glu Ala Val Asp Pro Leu Met Arg Arg Ala 370 375 380 | | |
| Ala Lys Thr Ile Asn Phe Gly Val Leu Tyr Gly Met Ser Ala His Arg 385 390 395 400 | | |
| Leu Ser Gln Glu Leu Ala Ile Pro Tyr Glu Glu Ala Gln Ala Phe Ile 405 410 415 | | |
| Glu Arg Tyr Phe Gln Ser Phe Pro Lys Val Arg Ala Trp Ile Glu Lys 420 425 430 | | |
| Thr Leu Glu Glu Gly Arg Arg Arg Gly Tyr Val Glu Thr Leu Phe Gly 435 440 445 | | |
| Arg Arg Arg Tyr Val Pro Asp Leu Glu Ala Arg Val Lys Ser Val Arg 450 455 460 | | |
| Glu Ala Ala Glu Arg Met Ala Phe Asn Met Pro Val Gln Gly Thr Ala 465 470 475 480 | | |
| Ala Asp Leu Val Lys Leu Ala Met Val Lys Leu Phe Pro Arg Leu Glu 485 490 495 | | |

Glu Met Gly Ala Arg Met Leu Leu Gln Val His Asp Glu Leu Val Leu
500 505 510

Glu Ala Pro Lys Glu Gly Ala Glu Ala Val Ala Arg Leu Ala Lys Glu
515 520 525

Val Met Glu Gly Val Tyr Pro Leu Ala Val Pro Leu Glu Val Glu Val
530 535 540

Gly Ile Gly Glu Asp Trp Leu Ser Ala Lys Glu Ala Ala Ala Leu Val
545 550 555 560

Pro Arg

<210> 39
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 39

Met Ala Ser Gly Gly Gly Gly Cys Gly Gly Gly Gly
1 5 10

<210> 40
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 40

Ala Ala Ala Leu Val Pro Arg Gly Ser Leu Glu His His His His His
1 5 10 15

His

<210> 41
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 41

Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
1 5 10 15

Ala Gln Pro Ala Met Ala
20

<210> 42
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 42

Met Lys Thr Leu Leu Ala Met Val Leu Val Gly Leu Leu Leu Leu Pro
1 5 10 15

Pro Gly Pro Ser Met Ala
20

<210> 43
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 43

Met Arg Gly Leu Leu Ala Met Leu Val Ala Gly Leu Leu Leu Leu Pro
1 5 10 15

Ile Ala Pro Ala Met Ala
20

<210> 44
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 44

Met Arg Arg Leu Leu Val Ile Ala Ala Gly Leu Leu Leu Leu Leu Ala
1 5 10 15

Pro Pro Thr Met Ala
20

<210> 45
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic DNA

<400> 45
gcggccgcac tggtgccgcg cggcagcctc gag

33

<210> 46
<211> 148
<212> PRT
<213> Homo sapiens

<400> 46

Ala Asp Gln Leu Thr Glu Glu Gln Ile Ala Glu Phe Lys Glu Ala Phe
1 5 10 15

Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr Ile Thr Thr Lys Glu Leu
20 25 30

Gly Thr Val Met Arg Ser Leu Gly Gln Asn Pro Thr Glu Ala Glu Leu
35 40 45

Gln Asp Met Ile Asn Glu Val Asp Ala Asp Gly Asn Gly Thr Ile Asp
 50 55 60

Phe Pro Glu Phe Leu Thr Met Met Ala Arg Lys Met Lys Asp Thr Asp
 65 70 75 80

Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg Val Phe Asp Lys Asp Gly
 85 90 95

Asn Gly Tyr Ile Ser Ala Ala Glu Leu Arg His Val Met Thr Asn Leu
 100 105 110

Gly Glu Lys Leu Thr Asp Glu Glu Val Asp Glu Met Ile Arg Glu Ala
 115 120 125

Asp Ile Asp Gly Asp Gly Gln Val Asn Tyr Glu Glu Phe Val Gln Met
 130 135 140

Met Thr Ala Lys
 145

<210> 47
 <211> 114
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic DNA

<400> 47

Gln Val Gln Leu Gln Gln Ser Gly Pro Glu Asp Val Lys Pro Gly Ala
 1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Asp Tyr
 20 25 30

Tyr Met Asn Trp Val Lys Gln Ser Pro Gly Lys Gly Leu Glu Trp Ile
 35 40 45

Gly Asp Ile Asn Pro Asn Asn Gly Gly Thr Ser Tyr Asn Gln Lys Phe
50 55 60

Lys Gly Arg Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Met Glu Leu Arg Ser Leu Thr Ser Glu Asp Ser Ser Val Tyr Tyr Cys
85 90 95

Glu Ser Gln Ser Gly Ala Tyr Trp Gly Gln Gly Thr Thr Val Thr Val
100 105 110

Ser Ala

<210> 48
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 48

Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly
1 5 10 15

Gly Gly Gly Ser
20

<210> 49
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Peptide

<400> 49

Asp Tyr Lys Asp Ile Leu Met Thr Gln Thr Pro Ser Ser Leu Pro Val
1 5 10 15

Ser Leu Gly Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile
 20 25 30

Val His Ser Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro
 35 40 45

Gly Gln Ser Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser
 50 55 60

Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr
 65 70 75 80

Leu Lys Ile Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys
 85 90 95

Phe Gln Gly Ser His Val Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu
 100 105 110

Glu Ile Lys Arg
 115

<210> 50
 <211> 291
 <212> PRT
 <213> Thermus thermophilus

<400> 50

Met Glu Ala Met Leu Pro Leu Phe Glu Pro Lys Gly Arg Val Leu Leu
 1 5 10 15

Val Asp Gly His His Leu Ala Tyr Arg Thr Phe Phe Ala Leu Lys Gly
 20 25 30

Leu Thr Thr Ser Arg Gly Glu Pro Val Gln Ala Val Tyr Gly Phe Ala
 35 40 45

Lys Ser Leu Leu Lys Ala Leu Lys Glu Asp Gly Tyr Lys Ala Val Phe
 50 55 60

Val Val Phe Asp Ala Lys Ala Pro Ser Phe Arg His Glu Ala Tyr Glu
65 70 75 80
Ala Tyr Lys Ala Gly Arg Ala Pro Thr Pro Glu Asp Phe Pro Arg Gln
85 90 95
Leu Ala Leu Ile Lys Glu Leu Val Asp Leu Leu Gly Phe Thr Arg Leu
100 105 110
Glu Val Pro Gly Tyr Glu Ala Asp Asp Val Leu Ala Thr Leu Ala Lys
115 120 125
Lys Ala Glu Lys Glu Gly Tyr Glu Val Arg Ile Leu Thr Ala Asp Arg
130 135 140
Asp Leu Tyr Gln Leu Val Ser Asp Arg Val Ala Val Leu His Pro Glu
145 150 155 160
Gly His Leu Ile Thr Pro Glu Trp Leu Trp Glu Lys Tyr Gly Leu Arg
165 170 175
Pro Glu Gln Trp Val Asp Phe Arg Ala Leu Val Gly Asp Pro Ser Asp
180 185 190
Asn Leu Pro Gly Val Lys Gly Ile Gly Glu Lys Thr Ala Leu Lys Leu
195 200 205
Leu Lys Glu Trp Gly Ser Leu Glu Asn Leu Leu Lys Asn Leu Asp Arg
210 215 220
Val Lys Pro Glu Asn Val Arg Glu Lys Ile Lys Ala His Leu Glu Asp
225 230 235 240
Leu Arg Leu Ser Leu Glu Leu Ser Arg Val Arg Thr Asp Leu Pro Leu
245 250 255
Glu Val Asp Leu Ala Gln Gly Arg Glu Pro Asp Arg Glu Gly Leu Arg

260

265

270

Ala Phe Leu Glu Arg Leu Glu Phe Gly Ser Leu Leu His Glu Phe Gly
 275 280 285

Leu Leu Glu
 290

<210> 51
 <211> 196
 <212> PRT
 <213> Escherichia coli
 <400> 51

Val Ile Ser Tyr Asp Asn Tyr Val Thr Ile Leu Asp Glu Glu Thr Leu
 1 5 10 15

Lys Ala Trp Ile Ala Lys Leu Glu Lys Ala Pro Val Phe Ala Phe Asp
 20 25 30

Thr Glu Thr Asp Ser Leu Asp Asn Ile Ser Ala Asn Leu Val Gly Leu
 35 40 45

Ser Phe Ala Ile Glu Pro Gly Val Ala Ala Tyr Ile Pro Val Ala His
 50 55 60

Asp Tyr Leu Asp Ala Pro Asp Gln Ile Ser Arg Glu Arg Ala Leu Glu
 65 70 75 80

Leu Leu Lys Pro Leu Leu Glu Asp Glu Lys Ala Leu Lys Val Gly Gln
 85 90 95

Asn Leu Lys Tyr Asp Arg Gly Ile Leu Ala Asn Tyr Gly Ile Glu Leu
 100 105 110

Arg Gly Ile Ala Phe Asp Thr Met Leu Glu Ser Tyr Ile Leu Asn Ser
 115 120 125

Val Ala Gly Arg His Asp Met Asp Ser Leu Ala Glu Arg Trp Leu Lys

130

135

140

His Lys Thr Ile Thr Phe Glu Glu Ile Ala Gly Lys Gly Lys Asn Gln
 145 150 155 160

Leu Thr Phe Asn Gln Ile Ala Leu Glu Glu Ala Gly Arg Tyr Ala Ala
 165 170 175

Glu Asp Ala Asp Val Thr Leu Gln Leu His Leu Lys Met Trp Pro Asp
 180 185 190

Leu Gln Lys His
 195

<210> 52
 <211> 686
 <212> PRT
 <213> Bacillus circulans

<400> 52

Ala Pro Asp Thr Ser Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val
 1 5 10 15

Ile Tyr Gln Ile Phe Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn
 20 25 30

Asn Pro Thr Gly Ala Ala Phe Asp Gly Thr Cys Thr Asn Leu Arg Leu
 35 40 45

Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly
 50 55 60

Tyr Leu Thr Gly Met Gly Val Thr Ala Ile Trp Ile Ser Gln Pro Val
 65 70 75 80

Glu Asn Ile Tyr Ser Ile Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala
 85 90 95

Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr

| 100 | | | | | 105 | | | | | 110 | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Thr | Ile | Ala | Asp | Phe | Gln | Asn | Leu | Ile | Ala | Ala | Ala | His | Ala | Lys |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Asn | Ile | Lys | Val | Ile | Ile | Asp | Phe | Ala | Pro | Asn | His | Thr | Ser | Pro | Ala |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Ser | Ser | Asp | Gln | Pro | Ser | Phe | Ala | Glu | Asn | Gly | Arg | Leu | Tyr | Asp | Asn |
| 145 | | | | | | 150 | | | | | 155 | | | | 160 |
| Gly | Thr | Leu | Leu | Gly | Gly | Tyr | Thr | Asn | Asp | Thr | Gln | Asn | Leu | Phe | His |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| His | Asn | Gly | Gly | Thr | Asp | Phe | Ser | Thr | Thr | Glu | Asn | Gly | Ile | Tyr | Lys |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Asn | Leu | Tyr | Asp | Leu | Ala | Asp | Leu | Asn | His | Asn | Asn | Ser | Thr | Val | Asp |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Val | Tyr | Leu | Lys | Asp | Ala | Ile | Lys | Met | Trp | Leu | Asp | Leu | Gly | Ile | Asp |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Gly | Ile | Arg | Met | Asp | Ala | Val | Lys | His | Met | Pro | Phe | Gly | Trp | Gln | Lys |
| 225 | | | | | | 230 | | | | | 235 | | | | 240 |
| Ser | Phe | Met | Ala | Ala | Val | Asn | Asn | Tyr | Lys | Pro | Val | Phe | Thr | Phe | Gly |
| | | | 245 | | | | | | 250 | | | | | 255 | |
| Glu | Trp | Phe | Leu | Gly | Val | Asn | Glu | Val | Ser | Pro | Glu | Asn | His | Lys | Phe |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Ala | Asn | Glu | Ser | Gly | Met | Ser | Leu | Leu | Asp | Phe | Arg | Phe | Ala | Gln | Lys |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Val | Arg | Gln | Val | Phe | Arg | Asp | Asn | Thr | Asp | Asn | Met | Tyr | Gly | Leu | Lys |
| | 290 | | | | | 295 | | | | | 300 | | | | |

Ala Met Leu Glu Gly Ser Ala Ala Asp Tyr Ala Gln Val Asp Asp Gln
 305 310 315 320

Val Thr Phe Ile Asp Asn His Asp Met Glu Arg Phe His Ala Ser Asn
 325 330 335

Ala Asn Arg Arg Lys Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser
 340 345 350

Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Ser Gly
 355 360 365

Gly Thr Asp Pro Asp Asn Arg Ala Arg Ile Pro Ser Phe Ser Thr Ser
 370 375 380

Thr Thr Ala Tyr Gln Val Ile Gln Lys Leu Ala Pro Leu Arg Lys Cys
 385 390 395 400

Asn Pro Ala Ile Ala Tyr Gly Ser Thr Gln Glu Arg Trp Ile Asn Asn
 405 410 415

Asp Val Leu Ile Tyr Glu Arg Lys Phe Gly Ser Asn Val Ala Val Val
 420 425 430

Ala Val Asn Arg Asn Leu Asn Ala Pro Ala Ser Ile Ser Gly Leu Val
 435 440 445

Thr Ser Leu Pro Gln Gly Ser Tyr Asn Asp Val Leu Gly Gly Leu Leu
 450 455 460

Asn Gly Asn Thr Leu Ser Val Gly Ser Gly Gly Ala Ala Ser Asn Phe
 465 470 475 480

Thr Leu Ala Ala Gly Gly Thr Ala Val Trp Gln Tyr Thr Ala Ala Thr
 485 490 495

Ala Thr Pro Thr Ile Gly His Val Gly Pro Met Met Ala Lys Pro Gly
 500 505 510

Val Thr Ile Thr Ile Asp Gly Arg Gly Phe Gly Ser Ser Lys Gly Thr
 515 520 525

Val Tyr Phe Gly Thr Thr Ala Val Ser Gly Ala Asp Ile Thr Ser Trp
 530 535 540

Glu Asp Thr Gln Ile Lys Val Lys Ile Pro Ala Val Ala Gly Gly Asn
 545 550 555 560

Tyr Asn Ile Lys Val Ala Asn Ala Ala Gly Thr Ala Ser Asn Val Tyr
 565 570 575

Asp Asn Phe Glu Val Leu Ser Gly Asp Gln Val Ser Val Arg Phe Val
 580 585 590

Val Asn Asn Ala Thr Thr Ala Leu Gly Gln Asn Val Tyr Leu Thr Gly
 595 600 605

Ser Val Ser Glu Leu Gly Asn Trp Asp Pro Ala Lys Ala Ile Gly Pro
 610 615 620

Met Tyr Asn Gln Val Val Tyr Gln Tyr Pro Asn Trp Tyr Tyr Asp Val
 625 630 635 640

Ser Val Pro Ala Gly Lys Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln
 645 650 655

Gly Ser Thr Val Thr Trp Glu Gly Gly Ser Asn His Thr Phe Thr Ala
 660 665 670

Pro Ser Ser Gly Thr Ala Thr Ile Asn Val Asn Trp Gln Pro
 675 680 685

<210> 53
 <211> 399
 <212> PRT
 <213> Bordetella pertussis

<400> 53

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Gln | Gln | Ser | His | Gln | Ala | Gly | Tyr | Ala | Asn | Ala | Ala | Asp | Arg | Glu | 1 | 5 | 10 | 15 |
| Ser | Gly | Ile | Pro | Ala | Ala | Val | Leu | Asp | Gly | Ile | Lys | Ala | Val | Ala | Lys | 20 | 25 | 30 | |
| Glu | Lys | Asn | Ala | Thr | Leu | Met | Phe | Arg | Leu | Val | Asn | Pro | His | Ser | Thr | 35 | 40 | 45 | |
| Ser | Leu | Ile | Ala | Glu | Gly | Val | Ala | Thr | Lys | Gly | Leu | Gly | Val | His | Ala | 50 | 55 | 60 | |
| Lys | Ser | Ser | Asp | Trp | Gly | Leu | Gln | Ala | Gly | Tyr | Ile | Pro | Val | Asn | Pro | 65 | 70 | 75 | 80 |
| Asn | Leu | Ser | Lys | Leu | Phe | Gly | Arg | Ala | Pro | Glu | Val | Ile | Ala | Arg | Ala | 85 | 90 | 95 | |
| Asp | Asn | Asp | Val | Asn | Ser | Ser | Leu | Ala | His | Gly | His | Thr | Ala | Val | Asp | 100 | 105 | 110 | |
| Leu | Thr | Leu | Ser | Lys | Glu | Arg | Leu | Asp | Tyr | Leu | Arg | Gln | Ala | Gly | Leu | 115 | 120 | 125 | |
| Val | Thr | Gly | Met | Ala | Asp | Gly | Val | Val | Ala | Ser | Asn | His | Ala | Gly | Tyr | 130 | 135 | 140 | |
| Glu | Gln | Phe | Glu | Phe | Arg | Val | Lys | Glu | Thr | Ser | Asp | Gly | Arg | Tyr | Ala | 145 | 150 | 155 | 160 |
| Val | Gln | Tyr | Arg | Arg | Lys | Gly | Gly | Asp | Asp | Phe | Glu | Ala | Val | Lys | Val | 165 | 170 | 175 | |
| Ile | Gly | Asn | Ala | Ala | Gly | Ile | Pro | Leu | Thr | Ala | Asp | Ile | Asp | Met | Phe | 180 | 185 | 190 | |
| Ala | Ile | Met | Pro | His | Leu | Ser | Asn | Phe | Arg | Asp | Ser | Ala | Arg | Ser | Ser | 195 | 200 | 205 | |

Val Thr Ser Gly Asp Ser Val Thr Asp Tyr Leu Ala Arg Thr Arg Arg
 210 215 220

Ala Ala Ser Glu Ala Thr Gly Gly Leu Asp Arg Glu Arg Ile Asp Leu
 225 230 235 240

Leu Trp Lys Ile Ala Arg Ala Gly Ala Arg Ser Ala Val Gly Thr Glu
 245 250 255

Ala Arg Arg Gln Phe Arg Tyr Asp Gly Asp Met Asn Ile Gly Val Ile
 260 265 270

Thr Asp Phe Glu Leu Glu Val Arg Asn Ala Leu Asn Arg Arg Ala His
 275 280 285

Ala Val Gly Ala Gln Asp Val Val Gln His Gly Thr Glu Gln Asn Asn
 290 295 300

Pro Phe Pro Glu Ala Asp Glu Lys Ile Phe Val Val Ser Ala Thr Gly
 305 310 315 320

Glu Ser Gln Met Leu Thr Arg Gly Gln Leu Lys Glu Tyr Ile Gly Gln
 325 330 335

Gln Arg Gly Glu Gly Tyr Val Phe Tyr Glu Asn Arg Ala Tyr Gly Val
 340 345 350

Ala Gly Lys Ser Leu Phe Asp Asp Gly Leu Gly Ala Ala Pro Gly Val
 355 360 365

Pro Ser Gly Arg Ser Lys Phe Ser Pro Asp Val Leu Glu Thr Val Pro
 370 375 380

Ala Ser Pro Gly Leu Arg Arg Pro Ser Leu Gly Ala Val Glu Arg
 385 390 395

<210> 54

<211> 275
 <212> PRT
 <213> Bacillus amyloliquefaciens

<400> 54

Ala Gln Ser Val Pro Tyr Gly Val Ser Gln Ile Lys Ala Pro Ala Leu
 1 5 10 15

His Ser Gln Gly Tyr Thr Gly Ser Asn Val Lys Val Ala Val Ile Asp
 20 25 30

Ser Gly Ile Asp Ser Ser His Pro Asp Leu Lys Val Ala Gly Gly Ala
 35 40 45

Ser Met Val Pro Ser Glu Thr Asn Pro Phe Gln Asp Asn Asn Ser His
 50 55 60

Gly Thr His Val Ala Gly Thr Val Ala Ala Leu Asn Asn Ser Ile Gly
 65 70 75 80

Val Leu Gly Val Ala Pro Ser Ala Ser Leu Tyr Ala Val Lys Val Leu
 85 90 95

Gly Ala Asp Gly Ser Gly Gln Tyr Ser Trp Ile Ile Asn Gly Ile Glu
 100 105 110

Trp Ala Ile Ala Asn Asn Met Asp Val Ile Asn Met Ser Leu Gly Gly
 115 120 125

Pro Ser Gly Ser Ala Ala Leu Lys Ala Ala Val Asp Lys Ala Val Ala
 130 135 140

Ser Gly Val Val Val Val Ala Ala Ala Gly Asn Glu Gly Thr Ser Gly
 145 150 155 160

Ser Ser Ser Thr Val Gly Tyr Pro Gly Lys Tyr Pro Ser Val Ile Ala
 165 170 175

Val Gly Ala Val Asp Ser Ser Asn Gln Arg Ala Ser Phe Ser Ser Val

180

185

190

Gly Pro Glu Leu Asp Val Met Ala Pro Gly Val Ser Ile Gln Ser Thr
 195 200 205

Leu Pro Gly Asn Lys Tyr Gly Ala Tyr Asn Gly Thr Ser Met Ala Ser
 210 215 220

Pro His Val Ala Gly Ala Ala Ala Leu Ile Leu Ser Lys His Pro Asn
 225 230 235 240

Trp Thr Asn Thr Gln Val Arg Ser Ser Leu Glu Asn Thr Thr Thr Lys
 245 250 255

Leu Gly Asp Ser Phe Tyr Tyr Gly Lys Gly Leu Ile Asn Val Gln Ala
 260 265 270

Ala Ala Gln
 275

<210> 55
 <211> 182
 <212> PRT
 <213> Bacillus subtilis

<400> 55

Ala Ala Glu His Asn Pro Val Val Met Val His Gly Ile Gly Gly Ala
 1 5 10 15

Ser Phe Asn Phe Ala Gly Ile Lys Ser Tyr Leu Val Ser Gln Gly Trp
 20 25 30

Ser Arg Asp Lys Leu Tyr Ala Val Asp Phe Trp Asp Lys Thr Gly Thr
 35 40 45

Asn Tyr Asn Asn Gly Pro Val Leu Ser Arg Phe Val Gln Lys Val Leu
 50 55 60

Asp Glu Thr Gly Ala Lys Lys Val Asp Ile Val Ala His Ser Met Gly

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 65 | | 70 | | 75 | | 80 | | | | | | | | | |
| Gly | Ala | Asn | Thr | Leu | Tyr | Tyr | Ile | Lys | Asn | Leu | Asp | Gly | Gly | Asn | Lys |
| | | | | 85 | | | | 90 | | | | | | 95 | |
| Val | Ala | Asn | Val | Val | Thr | Leu | Gly | Gly | Ala | Asn | Arg | Leu | Thr | Thr | Gly |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Lys | Ala | Leu | Pro | Gly | Thr | Asp | Pro | Asn | Gln | Lys | Ile | Leu | Tyr | Thr | Ser |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ile | Tyr | Ser | Ser | Ala | Asp | Met | Ile | Val | Met | Asn | Tyr | Leu | Ser | Arg | Leu |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Asp | Gly | Ala | Arg | Asn | Val | Gln | Ile | His | Gly | Val | Gly | His | Ile | Gly | Leu |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Leu | Tyr | Ser | Ser | Gln | Val | Asn | Ser | Leu | Ile | Lys | Glu | Gly | Leu | Asn | Gly |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Gly | Gly | Gln | Asn | Thr | Asn | | | | | | | | | | |
| | | | 180 | | | | | | | | | | | | |

<210> 56
 <211> 444
 <212> DNA
 <213> Homo sapiens

| | |
|--|-----|
| <400> 56 | |
| gctgaccaac tgactgaaga gcagattgca gaattcaaag aagcttttttc actatttgac | 60 |
| aaagatgggtg atggaactat aacaacaaag gaattgggaa ctgtaatgag atctcttggg | 120 |
| cagaatccca cagaagcaga gttacaggac atgattaatg aagtagatgc tgatggtaat | 180 |
| ggcacaattg acttccctga atttctgaca atgatggcaa gaaaaatgaa agacacagac | 240 |
| agtgaagaag aaattagaga agcattccgt gtgtttgata aggatggcaa tggctatatt | 300 |
| agtgctgcag aacttcgcca tgtgatgaca aaccttggag agaagttaac agatgaagaa | 360 |
| gttgatgaaa tgatcaggga agcagatatt gatggtgatg gtcaagtaaa ctatgaagag | 420 |

tttgtacaaa tgatgacagc aaag

444

<210> 57

<211> 2058

<212> DNA

<213> *Bacillus circulans*

<400> 57

| | |
|--|------|
| gcgccggata cctcggtatc caacaagcaa aatttcagca ccgacgtcat ctatcaaatt | 60 |
| ttcacccgaca ggtttttcgga cggcaatccc gccacaatc cgaccggcgc ggcgtttgac | 120 |
| ggaacctgca cgaacctccg gctgtattgc ggcgggcgact ggcagggcat catcaacaaa | 180 |
| atcaacgacg gttacctgac cgggatgggc gttaccgcca tctggatctc ccagccggtc | 240 |
| gaaaacatct acagcatcat caattattcc ggcgtaaaca acacggccta tcacggctac | 300 |
| tgggcccggg acttcaagaa gacgaatccg gcctacggca cgattgcgga cttccagaac | 360 |
| ctgatcgccg ccgcgcatgc aaaaaacatc aaagtcatta tcgactttgc cccgaaccat | 420 |
| acgtcgcccg cctcgctcga ccagccttcc ttgcggaac acggccgggt gtacgataac | 480 |
| ggcacgctgc tcgggggata cacgaacgat acgcagaacc tgttccacca taacggcggc | 540 |
| acggactttt ccacgaccga aaacggcatc tacaaaaacc tgtacgatct cgccgacctg | 600 |
| aaccataaca acagcacctg ggacgtctac ttgaaggacg cgatcaaaat gtggctggac | 660 |
| ctcggcatcg acggcatccg catggatgcg gtgaagcata tgccgttcgg ctggcagaag | 720 |
| agctttatgg ctgccgtcaa caactataag ccggtcttta ccttcggcga atggttcctg | 780 |
| ggcgtaaagt aagtgagccc ggaaaaccat aagtttgcca acgaatccgg catgagcctg | 840 |
| cttgatttcc gttttgccc aaaggtgagg caggtgttcc gggacaacac cgacaatatg | 900 |
| tacggcctga aggcgatgct ggaggggtcc gcagccgatt acgcccagggt ggatgaccag | 960 |
| gtgacgttca tcgacaacca tgacatggag cgtttccacg caagcaatgc aaaccgcccg | 1020 |
| aagctggagc aagcgcttgc gttcacgctg acctcgcgcg gcgtccccgc catttattac | 1080 |
| ggcaccgagc agtacatgtc gggcgggacc gatccggaca accggggcgc gatcccttcc | 1140 |
| ttctccacgt cgacgaccgc ctatcaggtc attcaaaagc tggcgccgct gcgcaagtgc | 1200 |
| aaccggcca tcgcctacgg atcgacgcag gagcgctgga tcaacaacga cgtgctcatt | 1260 |

| | |
|---|------|
| tatgagcgca aattcggcag caacgttgcc gtcgttgccg tcaaccgcaa tttaaacgcg | 1320 |
| ccggcttcca ttctgggact tgtcacttcc ctgccgcaag gcagctacaa cgacgtcctt | 1380 |
| ggcggccttc tgaacggcaa cacgttatcg gtaggctccg gcggggccgc ctccaatttc | 1440 |
| acgcttgccg ccggcggcac ggcggtgtgg cagtacaccg cggctacggc gacgccgacc | 1500 |
| atcgggcatg tcgggccgat gatggccaag ccgggcgtga cgatcacgat cgacggccgc | 1560 |
| ggcttcggct ctagcaaagg caccgtctac ttcggtacga cggcggtgag cggggcggac | 1620 |
| atcacgtctt gggaagacac gcagatcaaa gtgaaaattc cggccgtcgc aggcggcaac | 1680 |
| tacaacatta aagtcgcaaa cgctgccgga acggcaagca atgtgtatga caacttcgag | 1740 |
| gtattgtccg gagaccaggt cagcgtccgc ttcgtggtca acaacgcgac gacggccctt | 1800 |
| gggcaaaatg tgtacctgac gggcagtgtc agcgagctgg ggaactggga cccggcaaaa | 1860 |
| gcaatcgggc cgatgtacaa tcaggtcgtt taccaatatc cgaactggta ttatgacgtc | 1920 |
| agcgttccgg ccggcaaaac gatcgagttc aagtttttga aaaaacaagg ctccaccgtc | 1980 |
| acgtgggaag gcggcagcaa ccacaccttc accgcgccgt ccagcggcac cgcgaccatt | 2040 |
| aacgtgaatt ggcagcca | 2058 |

<210> 58
 <211> 1197
 <212> DNA
 <213> Bordetella pertussis

| | |
|--|-----|
| <400> 58 | |
| atgcagcaat cgcacaggc tggttacgca aacgccgccg accgggagtc tggcatcccc | 60 |
| gcagccgtac tcgatggcat caaggccgtg gcgaaggaaa aaaacgccac attgatgttc | 120 |
| cgcttggta accccattc caccagcctg attgccgaag ggggtggccac caaaggattg | 180 |
| ggcgtgcacg ccaagtcgtc cgattggggg ttgcaggcgg gctacattcc cgtcaaccgc | 240 |
| aatctttcca aactgttcgg ccgtgcgccc gaggtgatcg cgcgggccga caacgacgtc | 300 |
| aacagcagcc tggcgcacatg ccataccgcg gtcgacctga cgctgtcgaa agagcggctt | 360 |
| gactatctgc ggcaagcggg cctggtcacc ggcatggccg atggcgtggg cgcgagcaac | 420 |
| cacgcaggct acgagcagtt cgagtttcgc gtgaaggaaa cctcggacgg gcgctatgcc | 480 |

| | |
|---|------|
| gtgcagtatc gccgcaaggg cggcgacgat ttcgaggcgg tcaaggtgat cggcaatgcc | 540 |
| gccggtattc cactgacggc ggatatcgac atgttcgcca ttatgccgca tctgtccaac | 600 |
| ttccgcgact cggcgcgagc ttcggtgacc agcggcgatt cggtgaccga ttacctggcg | 660 |
| cgcacgcggc gggccgccag cgaggccacg ggcggcctgg atcgcgaacg catcgacttg | 720 |
| ttgtggaaaa tcgctcgcg cggcgcccgt tccgcagtgg gcaccgaggc gcgtcgccag | 780 |
| ttccgctacg acggcgacat gaatatcggc gtgatcaccg atttcgagct ggaagtgcgc | 840 |
| aatgcgctga acaggcgggc gcacgccgtc ggcgcgcagg acgtggtcca gcatggcact | 900 |
| gagcagaaca atcctttccc ggaggcagat gagaagattt tcgtcgtatc ggccaccggt | 960 |
| gaaagccaga tgctcacgcg cgggcaactg aaggaataca ttggccagca gcgcggcgag | 1020 |
| ggctatgtct tctacgagaa ccgtgcatac ggcgtggcgg ggaaaagcct gttcgacgat | 1080 |
| gggctgggag ccgcgcccgg cgtgccgagc ggacgttcga agttctcgcc ggatgtactg | 1140 |
| gaaacgggtgc cggcgtcacc cggattgcgg cggccgctgc tgggcgcagt ggaacgc | 1197 |

<210> 59

<211> 825

<212> DNA

<213> *Bacillus amyloliquefaciens*

<400> 59

| | |
|--|-----|
| gcgcagtccg tgccttacgg cgtatcacaa attaaagccc ctgctctgca ctctcaaggc | 60 |
| tacactggat caaatgttaa agtagcgggt atcgacagcg gtatcgattc ttctcatcct | 120 |
| gatttaaagg tagcaggcgg agccagcatg gttccttctg aaacaaatcc tttccaagac | 180 |
| aacaactctc acggaactca cgttgccggc acagttgcgg ctcttaataa ctcaatcggc | 240 |
| gtattaggcg ttgcgccaag cgcatacact tacgctgtaa aagttctcgg tgctgacggc | 300 |
| tccggccaat acagctggat cattaacgga atcgagtggg cgatcgcaaa caatatggac | 360 |
| gttattaaca tgagcctcgg cggaccttct ggttctgctg ctttaaaagc ggcagttgat | 420 |
| aaagccgttg catccggcgt cgtagtcggt gcggcagccg gtaacgaagg cacttccggc | 480 |
| agctcaagca cagtgggcta ccctggtaaa tacccttctg tcattgcagt aggcgctggt | 540 |
| gacagcagca accaaagagc atcttttctca agcgtaggac ctgagcttga tgtcatggca | 600 |

| | | | | | | |
|------------|------------|------------|------------|------------|------------|-----|
| cctggcgtat | ctatccaaag | cacgcttcct | ggaacaaaat | acggggcgta | caacggtacg | 660 |
| tcaatggcat | ctccgcacgt | tgccggagcg | gctgctttga | ttctttctaa | gcacccgaac | 720 |
| tggacaaaca | ctcaagtccg | cagcagttta | gaaaacacca | ctacaaaact | tggtgattct | 780 |
| ttctactatg | gaaaagggct | gatcaacgta | caggcggcag | ctcag | | 825 |

<210> 60
 <211> 873
 <212> DNA
 <213> *Thermus thermophilus*

| | |
|------------|--|
| <400> 60 | |
| atggaggcga | tgcttccgct ctttgaaccc aaaggccggg tcctcctggg ggacggccac 60 |
| cacctggcct | acgcacctt cttcgccctg aagggcctca ccacgagccg gggcgaaccg 120 |
| gtgcaggcgg | tctacggctt cgccaagagc ctctcaagg ccctgaagga ggacgggtac 180 |
| aaggccgtct | tcgtggtctt tgacgccaag gccccctcct tccgccacga ggcctacgag 240 |
| gcctacaagg | cggggagggc cccgaccccc gaggacttcc cccggcagct cgccctcatc 300 |
| aaggagctgg | tggacctcct ggggtttacc cgcctcgagg tccccggcta cgaggcggac 360 |
| gacgttctcg | ccaccctggc caagaaggcg gaaaaggagg ggtacgaggt gcgcatcctc 420 |
| accgccgacc | gcgacctcta ccaactcgtc tccgaccgcg tcgccgtcct ccaccccgag 480 |
| ggccacctca | tcaccccgga gtggctttgg gagaagtacg gcctcaggcc ggagcagtgg 540 |
| gtggacttcc | gcgccctcgt gggggacccc tccgacaacc tccccggggg caagggcatc 600 |
| ggggagaaga | ccgccctcaa gctcctcaag gagtggggaa gcctggaaaa cctcctcaag 660 |
| aacctggacc | gggtaaagcc agaaaacgtc cgggagaaga tcaaggccca cctggaagac 720 |
| ctcaggctct | ccttggagct ctcccgggtg cgcaccgacc tccccctgga ggtggacctc 780 |
| gccagggggc | gggagcccga ccgggagggg cttagggcct tcctggagag gctggagttc 840 |
| ggcagcctcc | tccacgagtt cggcctcctg gag 873 |

<210> 61
 <211> 588
 <212> DNA
 <213> *Escherichia coli*

<400> 61

| | |
|---|-----|
| gtgatttctt atgacaacta cgtcaccatc cttgatgaag aaacactgaa agcgtggatt | 60 |
| gcgaagctgg aaaaagcgcc ggtatttgca ttgataccg aaaccgacag ctttgataac | 120 |
| atctctgcta acctggtcgg gctttctttt gctatcgagc caggcgtagc ggcatatatt | 180 |
| ccggttgctc atgattatct tgatgcgccc gatcaaactc ctgcgcgagc tgcactcgag | 240 |
| ttgctaaaac cgctgctgga agatgaaaag gcgctgaagg tcgggcaaaa cctgaaatac | 300 |
| gatcgcggtg ttctggcgaa ctacggcatt gaactgcgtg ggattgcgtt tgataccatg | 360 |
| ctggagtcct acattctcaa tagcgttgcc gggcgtcacg atatggacag cctcgcgga | 420 |
| cgttggttga agcacaaaac catcactttt gaagagattg ctggtaaagg caaaaatcaa | 480 |
| ctgaccttta accagattgc cctcgaagaa gccggacgtt acgccgccga agatgcagat | 540 |
| gtcaccttgc agttgcatct gaaaatgtgg ccggatctgc aaaaacac | 588 |